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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,223	01/22/2004	Peter C. Rieke	E-1563	1664

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EXAMINER	
SELLMAN, CACHET I	
ART UNIT	**PAPER NUMBER**
1762	

DATE MAILED: 07/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/764,223	RIEKE, PETER C.	
	Examiner	Art Unit	
	Cachet I. Sellman	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 April 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26 and 39* is/are pending in the application.

4a) Of the above claim(s) *27-38* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26 and 39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Acknowledgement is made of the amendment filed by the applicant on 4/24/2006, in which claims 1-3 were amended, claims 27-38 were withdrawn and claim 39 was added. Claims 1-26 and 39 are currently pending in U.S. Application Serial No. 10/764,223.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-26 and 39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In claim 1, the applicant amended the claim to add the limitation that the "reactive gas is not activated by the plasma unit", However, on page 7, lines 1-4 of the specification the applicant states that in one version the plasma exposure precedes the reactive gas exposure and that the plasma unit can incorporate an inlet for the reactive gas merely stating that the plasma exposure precedes the reactive gas exposure does not mean that the reactive gas can not be activated by the plasma unit. One of ordinary skill can take this statement to mean that the surface can be exposed to the plasma then a plasma can activate the reactive gas

before it is exposed to the surface therefore there is no support in the specification for the added limitation.

Response to Arguments

3. Applicant's arguments with respect to claims 1-26 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-8 and 23-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Dang et al. (US 2003/0113478 A1).

Dang et al. discloses a process of functionalizing a substrate which comprises the steps of treating the surface of the substrate with a plasma from a plasma unit [0063] to form one or more active species then exposing the treated surface to a selected gas or liquid under conditions effective to convert the active species to a stable functional group (abstract). Dang et al. further teaches that the process can be performed to enhance the wetting of the substrate [0074] as required by **claim 1**. The exposing to a reactive gas is performed in a separate chamber therefore the inlets are

spatially separated (Ex. 3) as required by **claim 2**. The exposure to the plasma temporally precedes the exposure to the reactive gas (abstract) as required by **claim 3**. The polymer is a polyhalogenated polymer such as polytetrafluoroethylene, polyvinyl chloride [0057] s required by **claims 4-6**. The polymer can be polypropylene, polyethylene, polystyrene or polycarbonate [0057] as required by **claims 7 and 8.** The plasma can be oxygen [0064] as required by claim 9. The functionalized polymer surface comprises the nonfunctionalized polymer surface with functional groups selected from the group consisting of acidic, basic and neutral functional groups attached thereto as required by **claim 23**. The acidic functional group can be carboxylate [0032] as required by **claim 24**. The basic functional group can be an amine [0032] as required by **claim 25**. The neutral functional group can be alcohol [0032] as required by **claim 26**.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 2, 8, 10-11, 13, 15-16, 19 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tarasevich et al. (WO 91/17286) in view of Dang et al. (US 2003/0113478 A1).

Tarasevich et al. discloses a process of modifying the surface of a polystyrene substrate by attaching sulphonate sites thereto. The process comprises the steps of placing the substrate into a reaction vessel, which is connected to a vacuum manifold and introducing SO_3 gas into the reaction vessel where the SO3 reacts with the substrate. The substrate was then removed and rinsed with deionized water (pg 15, lines 15-27 – pg. 16, liens 1-3). Tarasevich et al. further teaches that as a result of adding the sulphonate sites the contact angle decreased.
Tarasevich et al. does not teach exposing the surface to a plasma from a plasma unit as required by **claim 1 and 39.**

Dang et al. teaches a process of modifying a substrate surface by treating with a plasma at or near atmospheric pressure to form active species then exposing the treated surface to a selected gas or liquid to convert the active species to a stable functional group (abstract). Dang et al. teaches that the use of atmospheric plasma over vacuum results in low cost equipment, installation, operation and maintenance, the ability to perform high throughput and has the ability to treat substrates without significant increase in temperature of the substrate [0024]. Dang et al. teaches that the substrate can be any porous or nonporous polymer such as polystyrene.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Tarasevich et al. to include the use of the plasma unit of Dang et al. One would have been motivated to do so because both

disclose processes for functionalizing a polymer substrate and Dang et al. further teaches that using the atmospheric plasma results in low cost equipment, installation, operation and maintenance, the ability to perform high throughput and has the ability to treat substrates with out significant increase in temperature of the substrate therefore one would have a reasonable expectation of success in functionalizing the polymer surface with the added benefits taught by Dang et al.

The plasma and reactive gas are exposed to the surface using different chambers therefore the inlets are spatially separated as required by **claim 2**. As stated above Dang et al. teaches that the surface is exposed to the plasma then to the reactive gas as required by **claim 3**. The polymer can be polystyrene as required by **claim 8**. The plasma can be O_2 as required by **claim 9**. The reactive gas is SO_3 as required by claims **10, 11, and 13.** The surface is washed in water to remove the residue as required by **claims 15 and 16**.

Tarasevich et al. further teaches that the functionalized polymer surface is exposed to a liquid-phase reactant and heated to induce growth of a metal oxide on the surface (pg 17, lines 1-26). The functionalized surface was treated with NaOH solution after growing the metal oxide layer (pg 25, lines 20-23) as required by **claim 19**.

8. Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lidel (US 3761299) in view of Dang et al. (US 2003/0113478 A1).

Lidel discloses a process of treating polymeric surfaces to make them more hydrophilic (column 3,lines 12-21) by exposing them to a reactive gas that is activated by glow discharge plasma (abstract and column 13, lines 55-63). Lidel teaches that the polymeric substrate can be polycarbonate, polyethylene, polystyrene, polytetrafluoroethylene, and polypropylene (column 4, lines 10-21). The reactive gas can be N_2O_3, NO, NO_2, ClO_2, or O_2 (column 3, lines 25-35).

Lidel does not teach exposing the nonfunctionalized surfaces to the reactive gas where the reactive gas is not activated by the plasma unit as required by **claim 1**.

Dang et al. teaches a process of modifying a substrate surface by treating with plasma at or near atmospheric pressure to form active species then exposing the treated surface to a selected gas or liquid to convert the active species to a stable functional group (abstract). Dang et al. teaches that the use of atmospheric plasma over vacuum results in low cost equipment, installation, operation and maintenance, the ability to perform high throughput and has the ability to treat substrates without significant increase in temperature of the substrate [0024]. Dang et al. teaches that the substrate can be any porous or nonporous polymer such as polytetrafluoroethylene, polyvinyl chloride, polypropylene, polyethylene, polystyrene or polycarbonate [0057].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Lidel. to include the use of the plasma unit

of Dang et al. One would have been motivated to do so because both disclose processes for functionalizing a polymer substrate and Dang et al. further teaches that using the atmospheric plasma results in low cost equipment, installation, operation and maintenance, the ability to perform high throughput and has the ability to treat substrates with out significant increase in temperature of the substrate therefore one would have a reasonable expectation of success in functionalizing the polymer surface with the added benefits taught by Dang et al.

The plasma and reactive gas are exposed to the surface using different chambers therefore the inlets are spatially separated as required by **claim 2**. As stated above Dang et al. teaches that the surface is exposed to the plasma then to the reactive gas as required by **claim 3**. The polymer can be polytetrafluoroethylene, polypropylene, polyethylene, polystyrene as required by **claims 4-8**. The plasma can be O_2 as required by **claim 9**. The reactive gas can be an oxide such as ClO_2 and NO as required by **claims 10 -13**.

9. Claims 1, 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida (US 5346728) in view of Dang et al.

Yoshida discloses a method treating a polymer with a nonfunctionalized surface by exposing it to a plasma and reactive gas, which increases the hydrophilicity of the

polymer (column 1, lines 63-68, and column 2, lines 1-15. The polymer can be polyethylene or polyacrylate (column 2, lines 8-14).

Dang et al. teaches a process of modifying a substrate surface by treating with plasma at or near atmospheric pressure to form active species then exposing the treated surface to a selected gas or liquid to convert the active species to a stable functional group (abstract). Dang et al. teaches that the use of atmospheric plasma over vacuum results in low cost equipment, installation, operation and maintenance, the ability to perform high throughput and has the ability to treat substrates without significant increase in temperature of the substrate [0024]. Dang et al. teaches that the substrate can be any porous or nonporous polymer such as polyethylene [0057].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Yoshida. to include the use of the plasma unit of Dang et al. One would have been motivated to do so because both disclose processes for functionalizing a polymer substrate and Dang et al. further teaches that using the atmospheric plasma results in low cost equipment, installation, operation and maintenance, the ability to perform high throughput and has the ability to treat substrates with out significant increase in temperature of the substrate therefore one would have a reasonable expectation of success in functionalizing the polymer surface with the added benefits taught by Dang et al.

Yoshida further teaches that the reactive gas is iodine (column 1, line 65) as required by **claims 10 and 14**.

10. Claims 1-6, 9, and 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buchwalter et al. (US 5340451) in view of Dang et al. (US 2003/0113478 A1) and Covington (US 4131696).

Buchwalter discloses a process for increasing the hydrophilicity of a polymer surface by providing a polymer with a nonfunctionalized surface (column 2, lines 55-56 and column 4, lines 50-53); exposing the nonfunctionalized surface to a plasma (column 3, lines 20-22); and exposing the surface to a reactive gas (column 4, lines 38-41).

Buchwalter does not disclose exposing the surface to a reactive gas that is not activated by the plasma unit as required by **claim 1**.

Dang et al. teaches a process of modifying a substrate surface by treating with plasma at or near atmospheric pressure to form active species then exposing the treated surface to a selected gas or liquid to convert the active species to a stable functional group (abstract). Dang et al. teaches that the use of atmospheric plasma over vacuum results in low cost equipment, installation, operation and maintenance, the ability to perform high throughput and has the ability to treat substrates without

significant increase in temperature of the substrate [0024]. Dang et al. teaches that the substrate can be any porous or nonporous polymer such as polyethylene [0057].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Buchwalter to include the use of the plasma unit of Dang et al. One would have been motivated to do so because both disclose processes for functionalizing a polymer substrate and Dang et al. further teaches that using the atmospheric plasma results in low cost equipment, installation, operation and maintenance, the ability to perform high throughput and has the ability to treat substrates with out significant increase in temperature of the substrate therefore one would have a reasonable expectation of success in functionalizing the polymer surface with the added benefits taught by Dang et al.

The plasma and reactive gas are exposed to the surface using different chambers therefore the inlets are spatially separated as required by **claim 2**. As stated above Dang et al. teaches that the surface is exposed to the plasma then to the reactive gas as required by **claim 3**. The polymer can be polytetrafluoroethylene as required by **claims 4-6**. The plasma can be O_2 as required by **claim 9**. The reactive gas can be an hydrazine (column 7, lines 38-40) as required by claim 10. The polymers are immersed in water after exposing to a plasma and reactive gas (column 6, lines 1-8) as required by claims 15-16. The functionalized polymer surface contains acidic and basic

functional groups such as hydroxyl, carboxylic acid, peroxide or ester groups (column 5, lines 61-64) as required by claims 23-25).

Buchwalter does not teach exposing the functionalized polymer surface to a liquid phase reactant and heating the reactant to induce growth of a metal oxide on the functionalized polymer surface, or rinsing the polymer surface with NaOH after forming the metal oxide as required by **claims 17-19**.

Covington discloses a method of treating a contact lens of polymethylmethacrylate with an inert inorganic hydrous oxide to render the surface of the lens wettable (abstract). The lens is immersed in the liquid then later rinsed with water or a saline solution (column 2, lines 34-36) to remove any excess and on-adhering particles (column 3, liens 14-16). Treatment in the colloidal hydrous metal oxide results in an adhesion of colloidal particle to the surfaces of the lens, which in turn increases the wettability of the lens by fluids (column 2,lines42-45).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Buchwalter et al. in view of Dang et al. to include the step of exposing the polymer to a liquid reactant and heating to form a metal oxide as taught by Covington. One would have been motivated to do so because both Buchwalter et al. and Covington discloses processes for improving the wettability of polymer surfaces by exposing them to an aqueous solution of metal salt and Covington

further discloses that exposing the polymer to a solution of metal oxide prolongs the wettability of the polymer (column 2,liens 42-52) therefore one would have a reasonable expectation of success in forming a functionalized polymer surface with increased hydrophilicity.

As stated above the process can be used for contact lens as required by **claims 20-22**.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cachet I. Sellman whose telephone number is 571-272-0691. The examiner can normally be reached on Monday through Friday, 7:00 - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Cachet I Sellman
Examiner
Art Unit 1762

TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER